

KANSANS MOVE INTO HEALTH: A PROGRAM EVALUATION

by

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Abstract

Heart disease, cancer, stroke, and diabetes are the leading causes of death in the United States. In addition, the prevalence of obesity has significantly increased since the 1970s. In Kansas, 37% of adults are overweight and 24% are obese. These chronic diseases and conditions tend to be prevented by and/or managed with both adequate physical activity and a healthy diet rich in fruits, vegetables, and whole grains. In Kansas 48.5% of adults meet the current recommendations for physical activity set by the American Heart Association, while 20% of adults consume the recommended amounts of fruits and vegetables. Public health officials need to work together to encourage Kansas adults to increase their participation in physical activity and consumption of fruits and vegetables to help prevent future health problems or manage current chronic diseases.

To help address these health issues in Kansas, Kansas State University Research and Extension developed the 8-week *Kansans Move into Health* nutrition and physical activity program, building its framework around the Theory of Planned Behavior (TPB). Using TPB, participants address attitudes and perceived norms as well as perform specific behaviors associated with healthy eating and physical activity.

The purpose of this study was to evaluate the effectiveness of condensing the 8-week nutrition and physical activity program into four one-hour classes using a pre- and post-survey. Nineteen participants from the Johnson County community signed up to participate with 63% (n=12) completing the program. Results indicated that participants changed their belief that nutritious foods are more expensive ($p \leq 0.05$). Furthermore, participants gained knowledge in how to prepare healthy snacks that are quick and easy. All other measures did not change (n=19; $p > 0.05$). Future research evaluating longer program interventions could better assess attitudes and perceived norms associated with healthy behaviors and determine whether the increase in knowledge leads to behavior change.

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Dedication

I would like to dedicate this piece of work to my father, who has continued to support my academic endeavors for many years.

Chapter 1 - Review of the Literature

Overview

The leading causes of death in the US, which include heart disease, cancer, stroke, and diabetes, have been researched in depth. Both physical activity and a healthy diet, particularly a diet high in fruits, vegetables, and whole grains, provide many health benefits, including aiding in the prevention and management of these chronic diseases (Heron et al., 2009). In addition, obesity, which is associated with the leading causes of death, can be prevented by increasing physical activity and improving diet. Because obesity rates in the US are rising, public health officials address these concerns by creating short-term community interventions with the aim of enhancing lifestyle behaviors.

Background on US Health

Heart Disease

Heart disease is the leading cause of death in the US, accounting for 631,636 deaths per year (Heron et al., 2009). It is estimated that one in three American adults has one or more types of cardiovascular disease (CVD), with the risk of developing coronary heart disease increasing with age (Rosamond et al., 2008). In adults, the prevalence of congenital heart disease has increased from 1985 to 2000 (Marelli, Mackie, Ionescu-Ittu, Rahme & Pilote, 2007). Some common risk factors include smoking, obesity, and low fruit and vegetable consumption, with variations in risk depending on age, race/ethnicity, and sex (Rosamond et al., 2008). Obesity plays an important role in CVD development. Overweight and obesity result in elevated risk factors for CVD, including dyslipidemia, hypertension, and glucose intolerance (Eckel, Kahn, Robertson & Rizza, 2006; Poirier et al., 2006). One explanation suggests that a variety of adaptations in cardiac structure and function occur as adipose tissue accumulates in excess amounts (Poirier et al., 2006). US adults should participate in higher levels of physical activity, exercising 60 to 90 minutes on most days of the week, in order to prevent obesity and possibly CVD (Mosca et al., 2007).

Diet is also a key player in prevention of cardiovascular disease. A prudent diet high in intakes of fruits, vegetables, legumes, fish, poultry, and whole grains is associated with a 28% lower risk of CVD, whereas a Western diet that is high in red meat, processed meat, refined grains, French fries, and sweets/desserts is associated with a higher risk of mortality from CVD (Heidemann, Schulze, Franco, Van Dam, Mantzoros & Hu, 2008). Data on fruit and vegetable consumption has been inconclusive in regards to prevention of CVD. A randomized control trial found no significant reduction of CVD, stroke, or CHD in postmenopausal women with increased intakes of fruits and vegetables (Howard, Van Horn & Hsia, 2006). However, data from another longitudinal study of men and women illustrated that diets high in fresh fruit and salad greens provided protection against CVD (Cox, Whichelow & Prevest, 1999). Furthermore, an observational study predicted a decrease in cardiovascular deaths by 16% with increased consumption of fruits and vegetables (Van't Veer, Jansen, Klerk & Kok, 1999). When trying to prevent CVD mortality, women appear to benefit the most from increased fruit and vegetable intake, as higher consumption of fruits and vegetables are associated with decreased risk of death (Mosca et al., 2007; Nakamura, Nagata, Oba, Takatsuka & Shimizu, 2008).

Cancer

The second leading cause of death in the US is cancer (Heron et al., 2009). Roughly 1.4 million new cases of cancer are diagnosed and almost 565,000 deaths are expected from cancer. In men the most common and fatal cancer is lung cancer followed by prostate and colorectal cancers. Among women, breast cancer is the most common type of cancer, followed by colorectal and lung cancers, with lung cancer being the most fatal cancer (Jemal et al., 2006). Research has shown that being overweight/obese increases the risk for cancer of the esophagus, colorectal, and breast (postmenopausal). Furthermore, a body mass index in the range of 18.5 to 24.9 kg/m² should be maintained, with weight gain in adulthood avoided (Key et al., 2004). Some common causes or high risk behaviors that are associated with cancer include smoking, race/ethnicity, alcohol use, genetics, and regions of the country (Jemal et al., 2006).

Most lung cancers (roughly 80%) are caused by smoking (International Agency for Research on Cancer, 1990). However, diet may play an important role in lung cancer prevention. Although it is difficult to determine the confounding effects of smoking, some observational studies have found a reduction in risk of lung cancer with increased intake of

vegetables and, to a greater extent, fruits (Gonzalez, 2006; Key et al., 2004). One nutrient in particular has a protective effect on lung cancer— β -cryptoxanthin, found most commonly in citrus fruits (Mannisto et al., 2004). The relation between physical activity and lung cancer is hard to establish because of the effect of cigarette smoking, which is associated with decreased levels of physical activity, but many studies have found many protective effects of physical activity on lung cancer (Rundle, 2005).

The relationship between colorectal cancer and diet, specifically fiber, has been studied for over 30 years; however, data are inconclusive, perhaps due to numerous confounding factors, such as fiber source and cancer sub-site (Hill, 2003). Several case-control studies have observed a moderately lower risk of cancer in association with high consumption of dietary fiber and fruit and vegetable, but results from other prospective studies have been inconsistent, leaving the relationship between fiber, fruits and vegetables, and colorectal cancer unclear (Bueno, Mesquita, Ferrari & Riboli, 2002; Key et al., 2004). Dietary fiber intake has been shown to be inversely associated with colorectal cancer in some prospective cohort studies, which suggest a complex mechanism for prevention (Park et al., 2005). Because dietary fiber increases stool bulk and allows food to move through the colon faster, gut contents are diluted, which may reduce the absorption of carcinogens by colonic mucosa (La Vecchia, 2001). Furthermore, fermentation of fiber in the large intestine produces short chain fatty acids, which may protect against colorectal cancer (Hague, Elder, Hicks & Paraskeva, 1995). Short chain fatty acids are readily absorbed, and butyrate, in particular, has been studied for its role in promoting cell differentiation, cell-cycle arrest and apoptosis of transformed colonocytes, inhibiting the enzyme histone deacetylase and reducing transformation of primary to secondary bile acids as a result of colonic acidification (Hague et al., 1995; Nagengast, Grubben & van Munster, 1995; Wong, de Souza, Kendall, Emam & David, 2006). A positive association between the amount of vigorous exercise and the mean number of bowel movements has been found; however, transit time remains to be studied (Friedenreich et al., 2006; Sanjoaquin, Appleby, Spencer & Key, 2003). More research needs to be conducted to elucidate the effect of dietary fiber on colorectal cancer.

The hormone-related breast and prostate cancers involve complex dietary mechanisms. Contributing to breast cancer variations are age at menarche and breastfeeding, which may also be diet related (Key, Verkasalo & Banks, 2001). In particular, estrogen, either exogenous or endogenous, is considered to be the key breast carcinogen (Dunn, Wickerham & Ford, 2005).

Estrogen may stimulate cell proliferation and receptor-mediated hormonal activity, leading to the division of the normal and neoplastic breast epithelium (Russo & Russo, 2006). One case-control study of Chinese women found that a greater intake of fruits and vegetables is associated with decreased risk of breast cancers (Zhang, Ho, Chen, Fu, Cheng & Lin, 2009), and a prospective cohort study among Black women found a prudent diet to have a protective effect against breast cancer. However, fruits and vegetables were not found to be significantly associated with breast cancer in most studies, physical activity most likely reduces the risk for this cancer (Gonzalez, 2006; Key et al., 2004).

Hormones also play an important role in the growth of the prostate, with androgen being a key component. In fact, lower levels of androgen are moderately effective in treating prostate cancer (Key et al., 2004). While little is known about the etiology of prostate cancer, the Western diet is positively associated with prostate cancer. Many vegetables have been found to have a protective effect, including tomatoes/lycopene and other vegetables with carotenoids (Chan, Gann & Giovannucci, 2005). Furthermore, high intake of cruciferous vegetables may be associated with decreased risk of aggressive prostate cancer (Kirsh et al., 2007). Certain nutrients, including vitamin E, selenium, and vitamin C, have also shown protective effects against prostate cancer (Sonn, Aronson & Litwin, 2005). These nutrients are found in trace amounts in some fruits and vegetables. Physical activity has also been shown to impact prostate cancer. Recreational physical activity is associated with reduced risk of advanced prostate cancer and death (Nilsen, Romundstad & Vatten, 2006).

Stroke

Stroke is the third leading cause of death, accounting for roughly 137,000 deaths in the US per year (Heron et al., 2009). The incidence of stroke each year is approximately 78,000 people, new or recurrent, with age, race/ethnicity, and sex playing an important role in the onset of a stroke (Rosamond et al., 2008). A few modifiable risk factors of stroke include poor diet, physical inactivity, obesity, and body fat distribution. In fact, increased fruit and vegetable consumption is associated with reduced risk of stroke (Goldstein et al., 2006). Since obese individuals have higher cardiac output, they may have increased stroke volume (Poirier et al., 2006). Moderate- to heavy-physical activity has been found to be protective against risk of

stroke among men (Willey, Moon, Paik, Boden-Albala, Sacco & Elkind, 2009) and combined leisure and work in both men and women (Myint et al., 2006).

Diabetes

Diabetes, type 2 or non-insulin-dependent diabetes in particular, is the fifth most common leading cause of death among US adults (Heron et al., 2009). Furthermore, the prevalence of diabetes among adults aged 20 to 74 has increased significantly from 5.08% in 1976-1980 to 8.83% in 1999-2004. Additionally, the prevalence of diabetes increased concurrently with the prevalence of obesity (Gregg, Narayan, Thompson & Williamson, 2007). Type 2 diabetes and impaired fasting glucose levels were also a significant problem among US adolescents (Duncan, 2006). Among different ethnicities prevalence of diabetes is significantly disparate, with Hispanic Americans having a greater prevalence of type 2 diabetes than whites and blacks (Steyn et al., 2004). Type 2 diabetes is caused by resistance to the action of insulin, which can develop from physical inactivity, dietary attributes, and accumulation of excess weight to become overweight/obese (Steyn et al., 2004).

Several lifestyle behaviors may help protect against diabetes. Consumption of green leafy vegetables and fruits were associated with a reduced risk of diabetes, through their low energy density, low glycemic load, and high fiber and micronutrient content (Bazzano et al., 2002; Bazzano, Li, Joshipura & Hu, 2008). In contrast, fruit juices may be associated with increased risk of diabetes among women, possibly due to the lack of fiber and other phytochemicals in fruit juices (Bazzano et al., 2008). Studies of dietary fiber, specifically insoluble fiber and whole grains, have shown to prevent the risk of type 2 diabetes, due to its ability to reduce postprandial glucose response and lowering total and LDL cholesterol levels (Weickert & Pfeiffer, 2008). Moderate-intensity physical activity also substantially reduces the risk of type 2 diabetes, by reducing the risk of obesity (Jeon, Lokken, Hu & van Dam, 2007).

Obesity

Overweight and obesity are conditions that affect a majority of the adult US population. The prevalence of overweight and obesity (body mass index, or BMI, greater than or equal to 25 kg/m²) has increased from 47.4 percent in 1976-1980 to 66 percent in 2003-2004. When considered separately, obesity (BMI greater than or equal to 30 kg/m²) has increased from 15 percent to 34 percent over the same time period (Wang & Beydoun, 2007). Kansas has a similar

prevalence, with 28.8 percent obese and 64.6 percent overweight or obese in 2009 (CDC, 2009). Public health officials are searching for ways to manage and prevent this epidemic, since it is associated with many chronic diseases in the US. Several factors contribute to the increase in obesity prevalence, including a significant decrease in physical activity and an increase in the availability of higher-caloric and fat-dense foods, both of which lead to an imbalance between energy intake and expenditure (Martinez, 2000). Research has shown that abdominal, or visceral, fat, as opposed to subcutaneous adiposity, in women is significantly associated with risk of CVD and cancer, as measured by waist circumference (Zhang, Rexrode, van Dam, Li & Hu, 2008). Furthermore, women with mostly upper-body fat had much higher risks for diabetes and heart disease, due to increased levels of free fatty acids in the blood. Conversely, adults who had bigger thighs, and therefore subcutaneous fat, actually had a lowered risk for heart disease (Gaesser, 2002). Being obese also tends to be associated with higher risks of hypertension and cancer (Bray, 2004). Interventions that address physical activity and a healthier diet should be implemented to aid in decreasing the prevalence of obesity.

Guidelines and Trends

Physical Activity in Adults

According to the American Heart Association (Haskell et al., 2007), adults aged 18 to 64 should participate in two and a half hours (150 minutes) of moderate-intensity physical activity like walking or water aerobics, one and a quarter hours (75 minutes) of vigorous-intensity physical activity like jogging or swimming, or some combination of both types of physical activity. The 2001 Behavioral Risk Factor Surveillance System Survey (Macera et al., 2005) showed less than half of the US adults following these guidelines, with nearly one in five adults participating in no physical activity. In Kansas, 51.5 percent of adults do not participate in at least 30 minutes of moderate-intensity physical activity on five days per week or more or at least 20 minutes vigorous-intensity physical activity on three days per week or more (CDC, 2009).

Fruit and Vegetable Consumption in Adults

The guidelines for adult fruit and vegetable consumption are more complex, depending on gender, level of physical activity, and age, with most active adults requiring five servings of fruits and vegetables per day. Fruits and vegetables should be diverse in nutrient content for the

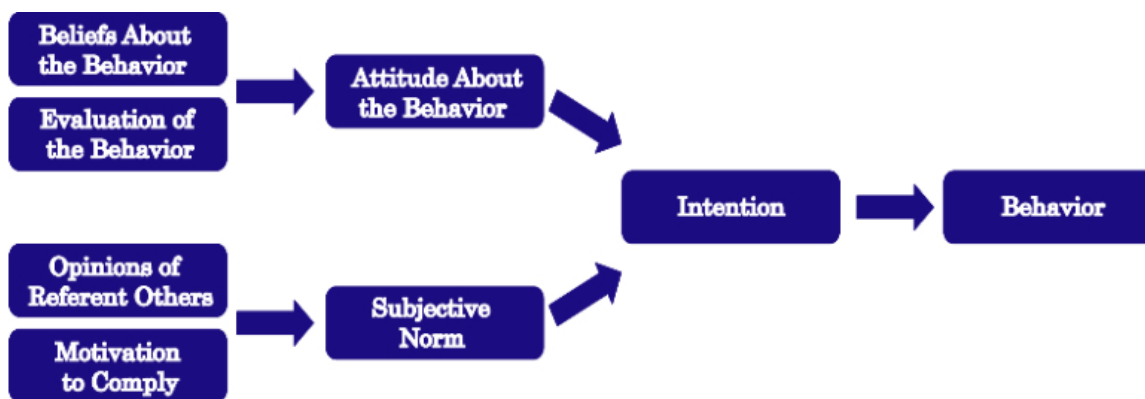
best health benefits (USDA, 2000). Only one quarter of American adults consume at least five cups of fruits and vegetables per day (Blanck, Gillespie, Kimmons, Seymour & Serdula, 2008). Unfortunately, Kansas fares worse with only one in five adults consuming recommended amounts (CDC, 2009).

The Theory of Planned Behavior

Development of the Theory

In the late 1960's Martin Fishbein and Icek Ajzen began exploring how to predict and explain human behavior, particularly the decision-making process. They developed the Theory of Reasoned Action to explain voluntary behavior in terms of intention to perform a behavior, which is the best predictor of a person's readiness to execute a behavior (Ajzen & Fishbein, 1980). They suggested that behavioral intention is a function of both the attitude a person has towards a behavior, or the personal desire to behave a particular way or not, and the subjective norm, or the belief about what others who are important to a person would think about that action (Gray, 2002).

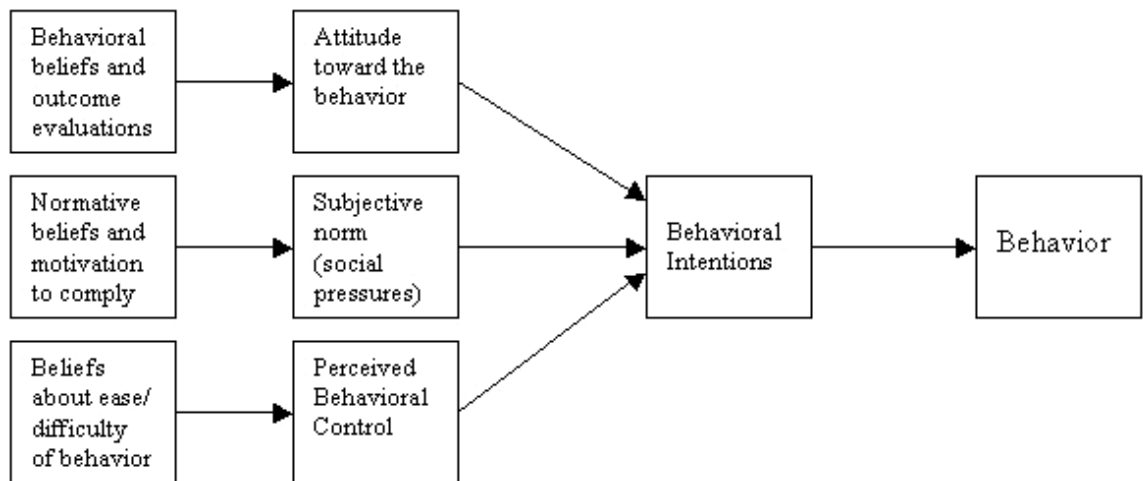
Figure 1.1 Theory of Reasoned Action, adapted from Fishbein & Ajzen (1980)



Feeling that this was not quite a complete picture of the individual motivational factors that determine the likelihood of performing a specific behavior, Ajzen (1991) suggested the Theory of Planned Behavior, which included a third component of behavioral intention, perceived behavioral control. This new factor not only reflects past experiences but also

anticipates impediments and obstacles. It refers to people’s sense of their own ability or inability to carry out an action (Ajzen, 1991). When coupled with behavior intentions, perceived behavioral control can help account for variance in actual behavior, especially when volitional control is limited (Ajzen & Manstead, 2007). It should be noted that all three components of behavioral intention can vary in different situations or for different behaviors, but when attitude and subjective norm are more favorable, and perceived behavioral control is high, a person’s motivation to perform the behavior should be strong (Ajzen & Manstead, 2007).

Figure 1.2 Theory of Planned Behavior, adapted from Ajzen (1990)



In addition to the three components that directly factor into behavioral intention, there are several background variables that contribute indirectly to a behavior by impacting the three beliefs. These include, but are not limited to, personal factors, such as self-esteem, personality traits, emotions, and health concerns; demographics, like age, gender, race/ethnicity, education, income, and religion; and environmental factors, such as diagnosis, stress, or media exposure (Ajzen & Manstead, 2007). He and colleagues (2004) found that some environmental factors, including peer/parental pressure and media exposure, can influence health-related lifestyles. Furthermore, Blanchard and colleagues (2003) found that people may change their lifestyle with diagnosis of an illness. A less consistent connection between lifestyle behavior and demographic variables is often observed (He et al., 2004).

Theory of Planned Behavior and Health Interventions

The primary goal of the Theory of Planned Behavior (TPB) is to change intentions, making the theory particularly useful in behavior change interventions, especially those related to health. For example, Brubaker and Fowler (1990) used TPB to encourage men to perform testicular self-examinations with the goal of catching early testicular cancer. Groups with messages about testicular cancer performed significantly higher testicular self-examinations than those groups without cancer messages, showing a behavior change as a result of change in intention. Many researchers have utilized this theory to plan and study interventions.

Physical Activity Interventions

In order to change behavioral intentions and motivations of physical activity using TPB, researchers have studied the beliefs that lead to intention and motivation to be physically active. In children, intention and self-identity was found to explain small variance in participation in physical activity (Bélanger-Gravel & Godin, 2010). Although no parental variables directly contributed to the prediction of behavioral intention in youth, parental support was found to contribute to self-efficacy, positive attitude, and perception of athleticism in a mediation analysis. Intentions to lose weight are predicted by attitude, subjective norms, and perceived control, and actual amount of weight lost can be predicted by perceived control and intention (Schifter & Ajzen, 1985). Many environmental and demographic factors also contribute to intention. Annual income is a moderator of the perceived behavioral control-behavior relationship (Amireault, Godin, Vohl & Pérusse, 2008). The relationship is stronger for individuals with higher income because they may have better resources and face fewer barriers. Interventions that reduce moderators that negatively impact the perceived behavioral control-behavior relationship, like income, may increase regular leisure-time physical activity, especially when combined with increasing motivation, particularly in low intenders. Physical activity in obese individuals may be determined by intention, including perceived behavioral control, anticipated regret and past behavior, but a favorable built environment slightly increases physical activity (Godin, Amireault, Bélanger-Gravel, Vohl & Pérusse, 2009). However, another study showed that BMI is a direct predictor of physical activity separate from the variables in TPB, impeding physical activity (Godin, Bélanger-Gravel & Nolin, 2008). In order to tailor interventions for obese individuals, the mechanism by which BMI influences leisure-time

physical activity needs to be clarified. General adult population interventions should address barriers like income and built environment, while also focusing on understanding attitudes and subjective norms as well as changing behavioral intention.

Healthy Eating Interventions

It is important to understand what constructs affect individuals' eating behaviors, so that successful interventions can be developed. A systematic review explored the main psychosocial determinants of fruit and vegetable intake while also determining the most used social cognition theories to describe this healthy behavior (Guillaumie, Godin & Vézina-Im, 2010). Most studies found fruit and vegetable intake was best predicted by habit, motivation and goals, belief about capabilities, knowledge, and taste. Furthermore, beliefs about capabilities, beliefs about consequences, and perceived social influences were the best explanations of intention to consume fruit and vegetables (Guillaumie, Godin & Vézina-Im, 2010). In an eight-year follow-up study, psychosocial factors contributing to healthy eating were studied to determine the target factors that influence future eating behaviors (Kvaavik, Lien, Tell & Klepp, 2005). Factors that predict behaviors for men and women were significantly different. Fruit and vegetable intake in men was best predicted by attitude, subjective norms, and perceived eating behavior, while whole grain consumption was explained by education and past behavior. On the other hand, fruit and vegetable intake in women was best predicted by perceived behavior control, perceived social norms, and past behavior, whereas whole grain intake was predicted by subjective norms, education, and past eating behavior. Furthermore, fat intake in men was only predicted by intention, but added sugar intake was predicted by household income and past consumption of sugar-rich foods. In women, perceived behavior control explained fat intake, whereas past intake of sugar-rich foods predicted added sugar intake (Kvaavik, Lien, Tell & Klepp, 2005). Since past eating behaviors have been shown to significantly affect current eating behaviors, it is beneficial to begin healthy eating interventions at a younger age to encourage healthy lifestyles. Researchers explored the connection between intention and healthy eating in Native American youths; however, they only found a correlation of healthy eating behaviors with barriers, attitudes, perceived behavior control, and subjective norms (Fila & Smith, 2006). When considered independently, boys' healthy eating behavior was predicted best by subjective norms, while girls' healthy eating behavior was best explained by barriers. In order to develop effective

interventions for Native American youths, healthy foods need to be more appealing to the youths (Fila & Smith, 2006).

Using TPB, researchers study constructs related to attitude, subjective norms, perceived behavioral control, intention, and barriers (Fila & Smith, 2006). Constructs related to attitude include a variety of items, such as importance of eating healthy foods, fruits, vegetables, regular soda, junk food, and fast food, as well as, perceptions of eating healthy and being overweight or underweight. Perceived behavior control constructs relate to external factors that may directly or indirectly influence healthy eating behaviors. They also include the availability of items like fruits and vegetables. Plans to eat healthy foods like fruits, vegetables, and whole grains in addition to plans to avoid junk foods and fast foods over a period of time are often the constructs used for intention. Other important considerations are barriers associated with eating healthy foods, like the perception of tastes, the ease of eating healthy away from home, and the ability to keep a healthy weight (Fila & Smith, 2006). Together these constructs help researchers develop interventions that can address certain attitudes, perceived norms, perceived behavioral control, intention, and barriers associated with healthy eating.

Strengths and Limitations of the Theory of Planned Behavior

The Theory of Planned Behavior is particularly successful in implementation intentions, which go further than other intentions by specifying where and when a particular behavior will occur (Ajzen & Manstead, 2007). Armitage (2004) used this approach to study dietary fat intake in intenders and non-intenders by giving intenders a message to implement health changes like decreasing fat intake, whereas non-intenders were given no message. At baseline, the two groups had the same dietary fat intake, but after a month the fat intake decreased significantly in the intender group, which also had significantly different intakes from the non-intender group. Implementation intentions allow researchers to create interventions tailored to beliefs that have been shown to differ significantly between intenders and non-intenders (Ajzen & Manstead, 2007). By altering intentions and the three beliefs that feed into intentions, researchers can create interventions that encourage healthy lifestyle changes.

Unfortunately, TPB does have its limitations. It does not address how certain beliefs should be changed, only that they need to be changed. Furthermore, while the theory has been successful when used with habitual behaviors or addictions, it can be difficult to act on good

intentions with these behaviors, even if it is a change for healthier behaviors. The strong dependencies on smoking or drug use, for example, can be beyond individual control, and neither intentions nor perceived control are good predictors of future behavior (Ajzen & Manstead, 2007). The purpose of expanding the Theory of Reasoned Action to the Theory of Planned Behavior was to include behaviors in which individuals may not have complete control over, like habits and addictions, by adding the perceived behavioral control component as a proxy for actual control. The theory predicts behaviors of limited control to a certain extent as long as individuals realize that their behavior may be beyond their control (Ajzen & Manstead, 2007).

Kansans Move into Health

Kansans Move into Health is a nutrition and physical activity program developed by Kansas State University Research and Extension. Based on the Theory of Planned Behavior, this program helps participants address attitudes and perceived norms along with performing specific behaviors associated with healthy eating and physical activity. In each of the eight lessons, topics are covered that county Extension agents identified in an informal focus group as relevant to Kansas health concerns. Those topics include the current obesity rates and other chronic diseases, the lack of physical activity by half of adults, and the low consumption of fruits and vegetables (CDC, 2009). In addition to encouraging healthy behaviors by stressing the American Heart Association guidelines, the lessons provide health messages to increase consumption of healthy foods and increase physical activity participation. Using health messages along with healthy guidelines has generally resulted in more physical activity (Latimer, Brawley & Bassett, 2010). Because many adults have busy work and family schedules, a shorter intervention may be beneficial. This study evaluated the effectiveness of condensing this 8-week program into four one-hour classes based on knowledge attainment.

Description of Topics Addressed and Materials Used

Myths and Perceptions

Essential to the Theory of Planned Behavior are attitude and subjective norms when predicting behavior. To address these beliefs, it is important to understand perceptions and myths about healthy eating and physical activity, especially in regards to benefits and barriers.

In a study of females, it was shown that there are more perceived benefits than barriers (Lovell, Ansari & Parker, 2010). The most significant perceived benefit was physical performance, followed by psychological outlook, preventive health, and life enhancement. Physical exertion was the highest perceived barrier amongst women. A study consisting of African Americans in North Carolina found that benefits played a more significant role than barriers (Pawlak & Colby, 2009). The most influential belief in this group was that healthy foods help to take care of the body, while a significant barrier was healthy foods are too expensive. Most people knew that certain foods are associated with health and the prevention of some diseases; however, knowledge did not necessarily match eating habits, as many people believed they under consumed healthy foods. Research on Dietary Health Preventive Behaviours, or actions that an individual who believes he is healthy performs to prevent or detect illness, has shown that determinants of these behaviors include health motivation, beliefs that diet can prevent disease, and nutritional knowledge (Petrovici & Ritson, 2006). Furthermore, attaining healthy information, like reading product contents, is predicted by health motivation, education, self-reported nutritional knowledge, and household income.

Because parents typically influence children perceptions, studying children's beliefs about healthy foods and physical activity is important. A Minnesotan study looking at child and parental perceptions of the home food environment (Robinson-O'Brien, Neumark-Sztainer, Hannan, Burgess-Champoux & Haines, 2009) found that children and their parents have similar views, with both believing there is high availability and accessibility to fruits and vegetables at home, but only half of the children believed their parents encouraged the consumption of fruits and vegetables. Parents need to encourage children to consume more fruits and vegetables by also having them available and easily accessible in an attempt to reduce junk food intake. In a discussion group among children and parents in Australia, many myths about healthy foods and physical activity emerged (Hesketh, Waters, Green, Salmon & Williams, 2005). For example, kids believed that products advertised as "diet" were healthy, and any food that was made from a natural product was healthy regardless of the final state. They also believed that any type of body movement was considered physical activity. For instance, playing video or computer games counted as physical activity because they are moving their fingers. Furthermore, both parents and children believed that unhealthy foods are counteracted by healthy foods. For

example, parents think that eating an unhealthy lunch that the school provides does not make their child's food intake unhealthy because it is only one meal during the day.

Myths and perceptions may not accurately depict healthy behaviors. To address these beliefs, subjects need to be aware of their current beliefs. Common myths should be addressed, so that people may begin forming new perceptions and beliefs.

Use and Validation of the 3-Day Food Log

A 3-day food log, also referred to as food record or food diary, allows participants to record the amount of and information about the food or beverage at the time of consumption. Portion sizes are often estimated using measuring cups, but occasionally scales are used (Lee & Nieman, 2007). There are many advantages of food records, such as providing respondents with detailed food intake data. Food logs also do not rely on the individual to recall items consumed from memory, which decreases the likelihood of a participant forgetting items or inaccurately reporting portion sizes. Most importantly, food records convey significant information about eating habits, which may increase knowledge about or awareness of participant food choices (Rebro, Patterson, Kristal & Cheney, 1998). Although a multiple-day food record is a better representation of usual diet intake than a 24-hour recall or 1-day food record, it does not necessarily account for seasonal variations in dietary intake (Block, 1989; Macdiarmid & Blundell, 1997). A few other weaknesses with the food diary include requiring literate and cooperative respondents. The process of filling out the food log may be too time intensive for some individuals, who may either misreport food consumption or alter their diet to simplify food intake recording (Forster, Jeffrey, VanNatta & Pirie, 1990; Macdiarmid & Blundell, 1997), resulting in underreporting of energy and nutrient intakes (Sawaya et al., 1996). People who complete a 3-day food and physical activity log may see a more accurate representation of their current lifestyle in terms of nutritional intake and level of physical activity and assess where changes need to be made.

Although there is no gold standard for dietary measurement, researchers have validated the 3-day food log against the 24-hour recall, 5-day Food Frequency Questionnaires (FFQ) (Crawford, Obarzanek, Morrison & Sabry, 1994), 7-day diet diary, and the FFQ (Deriemaeker, Aerenhouts, Hebbelinck & Clarys, 2006), but it may not be the best instrument for estimates of vitamin intake and energy percentages (Deriemaeker et al., 2006). It is a useful measurement in

estimating usual intake when multiple food logs on nonconsecutive days across several seasons are collected (Block, 1989; Macdiarmid & Blundell, 1997; Rebro et al., 1998).

Food and Beverage Labels

Label reading can be a very useful tool for individuals who want to prevent or control disease. Some diseases are associated with high intakes of some nutrients like saturated and trans fats (CVD), sodium (hypertension), and sugar (diabetes and obesity). By being aware of the contents of a product through the use of nutrition information on product labels, individuals may be able to avoid disease. Kreuter and colleagues (1997) found that label reading may influence dietary practices by studying the use of labels at point-of-purchase in patients consuming a low fat diet or a diet high in fruits, vegetables, whole grains, and fiber. Patients with high blood pressure looked for sodium contents on the labels more than other patients but not other nutrition information. Furthermore, patients with high cholesterol looked for saturated fat and cholesterol levels on the product labels but not any other information. People who understand the importance of eating a low-fat diet and the association between diet and cancer are more likely to use product labels (Neuhouser, Kristal & Patterson, 1999). In addition, individuals in the maintenance stage of change of adopting a low-fat diet were also more likely to read nutrition labels. However, there was no significant association between label use and fat intake. Other predictors of product information include nutritional education, age, sex (more females read nutrition labels), and attitude. Prior knowledge of nutrition and a positive attitude towards nutrition has the strongest effect (Misra, 2007). Type 2 diabetic women who were taught how to read a label and what to look for showed an increase in total knowledge, declarative knowledge, and procedural knowledge compared to controls (Miller, Jensen & Achterberg, 1999). Furthermore, they exhibited an increase in perceived confidence in label reading. Although Cowburn and Stockley (2004) found the reported use of label reading is high, actual use during food purchase may be much lower. Most people in the study understood some terms and simple calculations, but the comprehension decreased as the tasks became more complex. Developing an extensive lesson that encourages better understanding of labels may increase use of labels.

Restaurants: Healthy Foods

Compared to the 1980s, Americans tend to eat away from home more frequently (Kant & Graubard, 2004), making healthy food choices more difficult because consumers are allowing restaurants to take control of their meals. According to the CDC (2010), a healthy diet requires high intakes of fruits, vegetables, and whole grains with limited consumption of fat, sodium, and added sugars. Kozup and colleagues (2003) found that consumers had a more favorable opinion of foods when nutrition information or health claims are offered and are more likely to purchase these items. Although restaurants have begun including nutrition information and health claims on their menus, many menu items are still considered unhealthy, adding such items as fried meats and salty side dishes. Saelens and colleagues (2007) found that restaurants offering healthy main dishes have few healthy options (~9%), and only 12% of main dish salads are actually healthy. Furthermore, most restaurants (88%) do not offer fruit as a side item, and only fried vegetables were offered as sides in 47% of the sit-down restaurants and 73% of fast food restaurants. With all of the unhealthy items offered at restaurants, it is difficult for consumers to make health-conscious decisions. One study showed a positive association between eating-out frequency and body fatness in adults (McCrory et al., 1999). Raising awareness of which aspects contribute to an unhealthy dish may help them make better meal choices.

Media: Tips and Flags

Advertising is used to promote many “health” products, but consumers do not always know which products actually offer benefits and which are scams. Luckily quackery, or “the promotion for financial gain, of devices, treatments, services, plans, or products (including diets and supplements) that alter or claim to alter a human condition without proof of safety or effectiveness” (Sizer & Whitney, 2008, p. 23), can be identified with a few helpful tips and flags, such as use of testimonials, unpublished studies, and fake credentials, among others. To prevent consumers from purchasing fraudulent products and services, they can learn how to recognize nutrition quackery and where to find reliable information regarding products.

Physical Activity

Participation in physical activity has been shown to prevent many chronic diseases, like cardiovascular disease (Mosca et al., 2007), some cancers (Key et al., 2004), stroke (Rosamond et al., 2008), and diabetes (Steyn et al., 2004), and to manage obesity (Martinez, 2000). Exercise

has been reviewed extensively (Fletcher et al., 1996). It can increase high-density lipoprotein levels and improve aerobic endurance, joint flexibility, and muscle strength. Elderly individuals benefit from resistant training, and it is considered safe in this population (Stewart, Mason & Kelemen, 1988). Physical activity can also reduce anxiety and depression (Crews & Landers, 1987). Incorporating exercise into daily activities can be difficult, especially with adults' busy lives, but encouraging people to engage in physical activity by making them aware of the health benefits associated with exercise may convince them to fit it in to their daily routine.

Portion and Moderation

The increased availability of higher caloric and fat-dense foods contributes to the increased prevalence of obesity (Martinez, 2000). Because obesity has been linked with higher risks of chronic diseases like hypertension and cancer (Bray, 2004), it is important to reduce calorie intake of individuals. Between 1977 and 1998, food portion sizes both inside and outside the home have increased (Nielsen & Popkin, 2003). Over time, an increase in portion sizes has been associated with an increase in total energy intake (Edelman, Engell, Bronstein & Hirsch, 1986; McConahy, Smiciklas-Wright, Birch, Mitchell & Picciano, 2002). In addition, larger portion sizes at restaurants have resulted in increased energy intake, which may contribute to the increased prevalence of obesity (Diliberti, Bordi, Conklin, Roe & Rolls, 2004). Young adults tend to select bigger portions when compared to young adults from the 1980s, contributing to the idea of portion distortion, or the perception that large portion sizes are the appropriate amounts to eat at a single sitting (Schwartz & Byrd-Bredbenner, 2006). Americans, compared to the French, tend to eat more, have bigger portion sizes, and purchase larger individual serving size products from the grocery store (Rozin, Kabnick, Pete, Fischler & Shields, 2003). Similarly, people eat more out of larger containers than smaller containers (Wansink, 1996), making it difficult to eat in moderation. By encouraging people to be mindful of portion sizes and eating in moderation, this may help decrease caloric intake and possibly control or prevent obesity.

Emotional Eating

People need to distinguish the difference between emotional eating and physical hunger. The latter is our physiological drive to eat and is halted by a state of satiety (Wardlaw & Hampl, 2007). The hypothalamus is the main satiety regulator, but there are also many hormones that affect satiety, including endorphins, ghrelin, serotonin, norepinephrine, and dopamine, among

others (Bear, Connors & Paradiso, 2007; Stipanuk, 2006; Wardlaw & Hampl, 2007). For example, when the stomach is empty, ghrelin is released into the bloodstream, stimulating appetite (Bear, Connors & Paradiso, 2007). Dopamine is believed to be released in response to foods that taste good, motivating people to eat other foods that taste good. Serotonin is closely tied to emotions and has been shown to be positively associated with mood. It is released after a carbohydrate-rich meal, but low levels stimulate appetite (Leibowitz, Weiss, Walsh & Viswanath, 1989).

Emotional eating, on the other hand, is hunger triggered by an emotion (Hatfield, 2003). Some differences between emotional eating and physical hunger are emotional hunger strikes suddenly whereas physical hunger gradually increases; emotional eating is eating to satisfy a craving, which is extremely common among young adults (Hill, 2007), while physical hunger leaves a person open to options; and people continue to eat once they are full to feed emotional hunger, leaving them full of guilt rather than satisfaction (Hatfield, 2003; The Mayo Clinic Staff, 2009). Many cues contribute to emotional eating, including stress, mood, work, health, and relationships, among others (The Mayo Clinic Staff, 2009). Mindless eating, or eating without paying attention to how much is being consumed, is also a growing problem, especially as it contributes to the prevalence of overeating of many adults. Following oversized consumption norms, people may even disregard bad taste of food that is associated with certain activities. For example, movie-goers ate 38% more stale popcorn out of large popcorn containers than those eating popcorn out of medium containers (Wansink, Just & Payne, 2009). Mindless eating results in increased consumption, which may lead to overweight or obesity. Encouraging individuals to be more mindful of their actions has been shown to provide several health benefits, including better health of the mind, body, brain, and spirit (Greeson, 2009).

Healthy Snacks

Eating healthy snacks is an excellent way to manage hunger, as it provides a boost of energy, keeps metabolism running, and increases focus and concentration. Because portion sizes have increased over time (Nielsen & Popkin, 2003), encouraging participants to measure out snacks before eating them may help to decrease overconsumption of foods. Encouraging people to consume snacks that consists of fruits, vegetables, or whole grains may also promote a feeling of fullness, as these food items usually provide fiber (Burton-Freeman, 2000), which may

prevent mindless eating and minimize consumption of high-calorie, high-fat, and sugary foods that are common alternatives.

Adult Learners

A few theories on adult learners have been introduced since the 1920s. The most popular include andragogy and self-directed learning. Andragogy, the art and science of helping adults learn, assumes adults “1) have an independent self-concept and can direct his own learning, 2) have accumulated a reservoir of life experiences that is a rich resource for learning, 3) have learning needs closely related to changing social roles, 4) are problem-centered and interested in immediate application of knowledge, and 5) are motivated to learn by internal rather than external factors” (Merriam, 2001, p. 5). Self-directed learning has three goals for adult learning: “1) the development of the learner’s capacity to be self-directed, 2) the fostering of transformational learning, and 3) the promotion of emancipatory learning and social action” (Merriam, 2001, p. 7). The Kansans Move into Health program built upon these theories to structure lessons that would enhance adult learning.

Other Short-Term Interventions

Many short-term interventions have been found to be successful. The Walk Kansas program, an eight-week physical activity and fruit and vegetable intervention, has been shown to be effective by increasing physical activity in inactive-at-baseline participants and increasing fruit and vegetable consumption (Doerksen & Estabrooks, 2007; Estabrooks, Bradshaw, Dzewaltowski & Smith-Ray, 2008). Although the present study was only four weeks, other short interventions have been shown to be effective. For example, physicians delivering a short outpatient intervention affecting smoking cessation retained decreased smoking prevalence rates six-months after intervention (Ockene et al., 1994). On the other hand, nurses attending a three-hour seminar on asthma retained deficiencies in knowledge of preventive medicine and the management of exercise-induced asthma (Henry, Hazell & Halliday, 1993). The present study hopes to be effective despite the shortness of the program.

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Chapter 2 - Methodology

Introduction

The purpose of the *Kansans Move into Health* nutrition and physical activity program is to increase consumption of healthy foods like fruits, vegetables, and whole grains and decrease consumption of foods that are high in fat, trans fat, saturated fat, and sugar, in addition to other components. The program also works to increase participation in physical activity as well as involvement in different forms of physical activity, like aerobic and strength training. The program incorporates the Theory of Planned Behavior to allow participants to address attitudes and perceived norms as well as perform behaviors associated with healthy eating and physical activity. Kansas State University Research and Extension agents worked together in an informal focus group to determine the topics that are most relevant to the Kansas population in order to create a curriculum for four 1-hour classes that could be used in community settings, like public libraries, worksites, etc. In this study, the curriculum's effectiveness was determined using change in knowledge among participants through the use of a pre- and post-survey instrument.

The Intervention Process

Recruitment

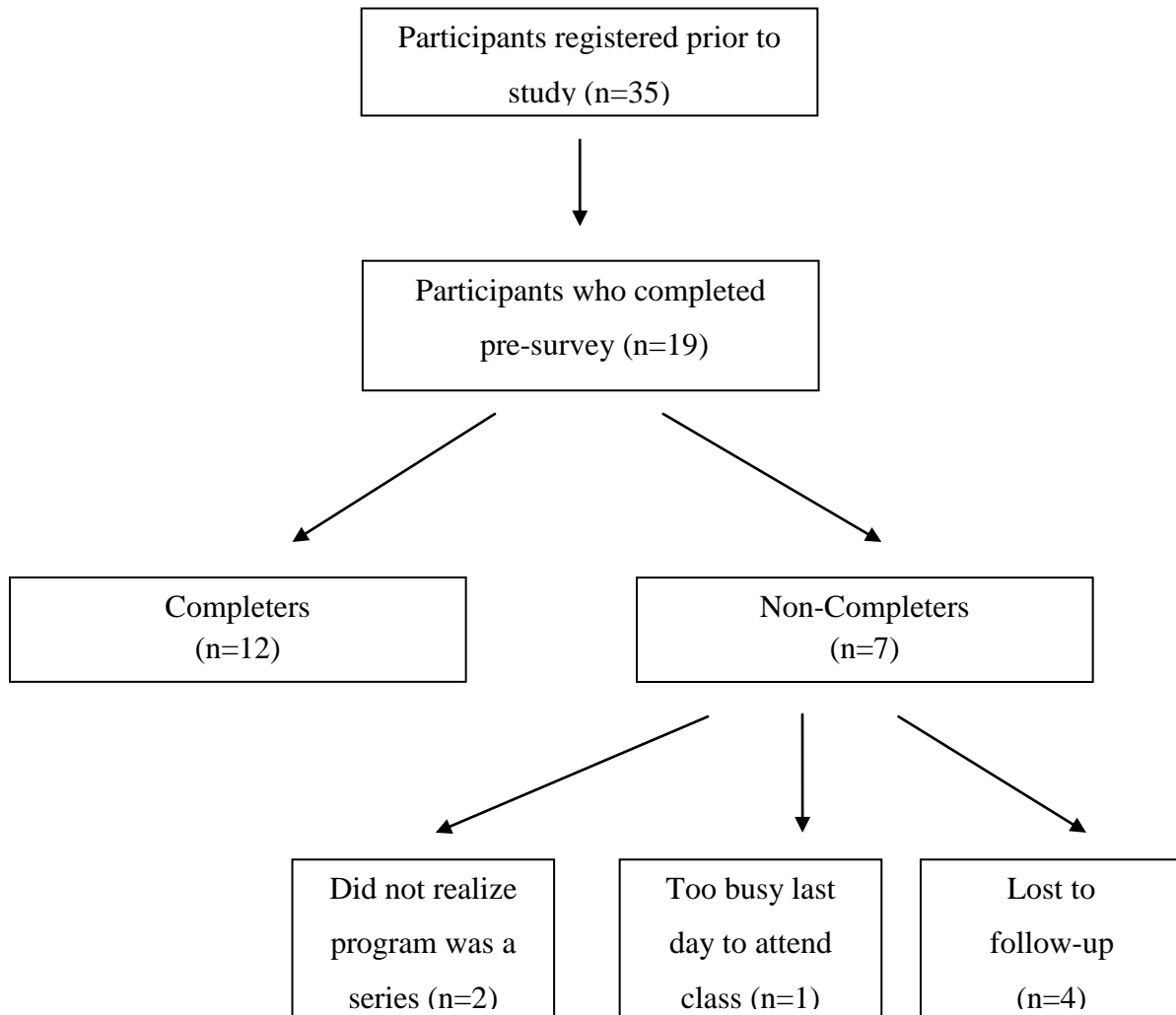
Before the start of the study, an approval from the Institutional Review Board (IRB) was obtained. Participants were recruited using the Johnson County website and newsletter as well as the Johnson County library website (Appendices A and B). The program was also promoted at a worksite location. Both programs were free.

Participants

Participants (n=19) signed a consent form and completed the pre-intervention questionnaire, which consisted of a total of 25 questions, including four demographic questions and 21 physical activity, nutrition, and healthy lifestyle questions (Appendices C and D). Attendance was taken at each class. Participants were labeled as completers, or participants who attended at least one of the first three classes plus the fourth class, and non-completers, or

participants who only attended one class (Figure 2.1). The post-intervention questionnaire was completed at the conclusion of the program.

Figure 2.1 Participant Flow Chart



Study Questionnaire

The questionnaire used for this study was developed using demographic questions from the Behavior Risk Factor Surveillance Survey (BRFSS), including sex, age, and ethnicity/race. Other nutrition and physical activity questions adapted from the BRFSS include participation in and amount of physical activity and consumption and amount of fruits and vegetables. All other measures used for the instrument addressed topics that are discussed in the intervention classes.

These measures are scaled on a 5-point Likert scale, with 1 being scored as “Strongly Agree” and 5 as “Strongly Disagree” (Montaño & Kasprzyk, 2008). Following the Theory of Planned Behavior, the measures were formed to address the attitudes and perceived norms associated with eating and physical activity.

The Intervention

Classes met one hour per week for four weeks. Each class was taught using a power point presentation and a handout (Appendices E-L) developed specifically for this program. Each week, participants were asked to complete an “Action Plan” that encouraged them to engage in a healthy behavior, like using the stairs instead of the elevators or incorporating more fruits and vegetables into their diet. Weekly homework assignments were also used to encourage participants to be aware of their health outside of class.

Class One: Myths and Perceptions

After a brief introduction, participants brainstormed current beliefs about nutrition and physical activity to address potential barriers to healthy behaviors, previously defined as participation in recommended physical activity and a diet rich in fruits, vegetable, and whole grains and limited in fats, sodium, and added sugars (CDC, 2008). Limiting beliefs, or the thoughts that place limitations on one’s own abilities and that he feels certain are true (Webster, 2006), were also discussed. Participants created their own “Weekly Action Plans” with the goal of making small, gradual changes towards a healthier lifestyle. Participants were given a 3-Day Food and Physical Activity Log to get an accurate portrayal of their typical eating and exercise habits (Rebro et al., 1998).

Class Two: Label Reading, Restaurants, and Media Sensationalism

Following the guidelines set by the United States Department of Agriculture (USDA, 2005), participants were explained how to read a typical food label. In particular, participants were taught nutrients to limit, with total fat less than 20% of daily recommendations, saturated fat less than 10%, and trans fat minimal, based on a 2000 calorie diet. Furthermore, sodium should be kept below 1,500 mg per day and added sugars less than 20% of daily recommendations. Participants were also taught which nutrients to encourage, like dietary fiber and vitamins and minerals. Participants learned to pay attention to the serving size and calories

per servings and how to read the ingredient list, which is listed in descending order. Specific words in the ingredient list were also explained. For example, “partially hydrogenated vegetable oil” means *trans* fat and “enriched flour” does not mean whole grain. Participants received blank labels to practice on foods at home.

Because Americans tend to eat away from home more frequently (Kant & Graubard, 2004), participants were given some tips for consuming food away from home. For example, some salads have more than 1600 calories, which is almost an entire day’s worth of calories (National Restaurant Association, 2010). Furthermore, eating steamed vegetables rather than fried vegetables is a way to decrease calories and avoid extra fat (USDA, 2005). Other tips include sharing meals or taking part of the meal.

The media often advertises “health” products that are scams, but consumers may not know how to differentiate between a beneficial item and a quackery product. Participants were given tips to determine quackery, such as use of testimonials, unpublished studies, and fake credentials, among others (Sizer & Whitney, 2008, p. 23).

Class Three: Physical Activity, Portion Control, and Moderation

To encourage participants to engage in physical activity, the guidelines set by the American Heart Association (Haskell et al., 2007) were described with examples of exercise outdoors and at home. Participants were taught how to determine their own heart rate to determine intensity of exercise.

Since portion sizes have increased from 1977 to 1998 (Nielsen & Popkin, 2003) as well as total energy intake (McConahy et al., 2002), portion sizes were taught to help control portion sizes. Participants were encouraged to be aware of eating in moderation according to the Dietary Guidelines (2005), and tips were suggested for eating in moderation. For example, placing snacks in a bowl rather than eating from the box, which limits the total calories consumed (Wansink, 1996).

Class Four: Emotional Eating and Healthy Snacks

Participants were given an emotional eating quiz to identify their food triggers that are typically associated with eating. Emotional eating was compared to physical hunger, and tips for other activities to incorporate when people are emotionally rather physically hungry were introduced. For example, instead of eating, people can go on a walk or read a book.

As an alternative to unhealthy emotional eating, healthy snack consumption can be integrated. Snacks can give an energy boost, with those high in fiber (fruits and vegetables) keeping individuals fuller longer (Burton-Freeman, 2000). Healthy snack ideas were suggested, like eating unsweetened dried fruit or peanut butter and celery.

Data Analysis

Data were analyzed using SPSS Statistics 17.0. Analysis included descriptive statistics for demographics and independent and paired t-tests for comparisons of the means to determine effectiveness of the program through knowledge attainment.

Completers versus Non-Completers

Completers and non-completers were compared using independent t-tests and descriptive statistics. In terms of participant characteristics, completers (C) and non-completers (NC) were not statistically different (Table 2.1, $p \leq 0.05$). Participants were mostly female (C=83.3%), and their ages spanned all age ranges, with most participants being 35-44 years old (C=33.3%). Most participants also identified as Non-Hispanic (C=91.7%) and white or black/African American (C=63.6% and 27.3%, respectively). It should be noted that the two groups did not statistically differ in age, but specific ages were not collected. Instead, age was collected as a range. This may be a cause of bias when comparing the two groups because one group may have had individuals at the higher end of a range, while the other group had individuals at the lower end of another range.

Table 2.1 Demographic Characteristics of Total Participants, Non-Completers, and Completers

Demographic	Total Participants (%) n=19	Non-Completers (%) n=7	Completers (%) n=12
Sex			
Male	26.3	42.9	16.7
Female	73.7	57.1	83.3
Age			
25-34	21.1	28.6	16.7
35-44	21.1	0	33.3
45-54	21.1	28.6	16.7
55-64	15.8	0	25.0
>65	21.5	42.9	8.3
Hispanic			
Yes	5.3	0	8.3
No	94.7	100	91.7
Race			
White	61.0	57.1	63.6
Black/African American	27.8	28.6	27.3
Asian	5.6	14.3	0
Other	5.6	0	9.1

*p<0.05

With respect to the nutrition and physical activity questions, completers and non-completers only significantly differed for two measures. Non-completers tended to be neutral about eating more when they are stressed, angry, or sad (Mean=3.00, p=0.028), whereas completers tended to agree with this measure (Mean=1.83). Non-completers also disagreed to the measure, “I like to try new diets or use weight-loss products,” (Mean=4.14, p=0.033), while completers were neutral about the measure (Mean=3.25). All other measures were not statistically different.

Table 2.2 Nutrition and Physical Activity Comparison of Means Between Completers (C) and Non-Completers (N)

Question		Mean ± SD	Levene’s Test		t-test
			F	Sig.	Sig. (2-tailed)
I live a healthy lifestyle.	C	2.55 ± 0.934	2.400	0.141	0.747
	NC	2.71 ± 1.254			
Nutritious foods are expensive.	C	2.36 ± 0.505	1.194	0.291	0.833
	NC	2.43 ± 0.787			

I need to spend hours at the gym to achieve health benefits.	C	3.50 ± 0.905	1.658	0.215	0.448
	NC	3.14 ± 1.069			
I read nutrition labels at the grocery store.	C	1.92 ± 0.900	0.079	0.782	0.410
	NC	2.29 ± 0.951			
I know what to look for on nutrition labels.	C	2.17 ± 1.165	0.358	0.558	0.760
	NC	2.29 ± 1.254			
I try to finish meals at restaurants.	C	2.67 ± 1.303	2.978	0.103	0.290
	NC	3.29 ± 0.951			
I share my meals with others at restaurants.	C	2.58 ± 1.165	0.363	0.555	0.821
	NC	2.71 ± 1.254			
I typically eat salads at restaurants because they are healthier than entrée options.	C	3.33 ± 1.155	0.028	0.870	0.181
	NC	2.57 ± 1.134			
I exercise during the workday by taking breaks, standing, and/or stretching.	C	2.58 ± 1.240	0.170	0.685	0.834
	NC	2.71 ± 1.380			
I exercise while on vacation.	C	3.08 ± 1.165	0.100	0.756	0.693
	NC	2.86 ± 1.215			
I take the stairs rather than the elevator or escalator when available.	C	2.33 ± 1.073	1.098	0.309	0.513
	NC	2.00 ± 1.000			
I exercise regularly.	C	2.82 ± 1.471	0.050	0.826	0.397
	NC	2.17 ± 1.472			
How often (in days) do you exercise per week?	C	3.09 ± 2.166	2.062	0.170	0.942
	NC	3.00 ± 3.055			
How many minutes per session are you physically active?	C	2.00 ± 0.775	7.657	0.014	0.532
	NC	2.43 ± 1.618			
I eat more when I am stressed, angry, or sad.	C	1.83 ± 0.937	0.295	0.594	0.028*
	NC	3.00 ± 1.155			
I eat more despite feeling full.	C	2.83 ± 1.267	0.418	0.527	0.320
	NC	3.43 ± 1.134			
I know how to plan quick, easy, and healthy snacks.	C	2.75 ± 1.055	0.008	0.928	0.285
	NC	3.29 ± 0.951			
I like to try new diets or use weight-loss products.	C	3.25 ± 1.215	6.751	0.019	0.033*
	NC	4.14 ± 0.387			
I eat fruits and vegetables regularly.	C	2.17 ± 1.115	0.141	0.712	0.964
	NC	2.14 ± 1.069			

How often (in days) do you eat fruits and vegetables per week?	C	5.58 ± 1.929	1.278	0.274	0.511
	NC	4.86 ± 2.795			
How many cups of fruits and vegetables do you eat per day?	C	2.40 ± 1.265	0.733	0.405	0.530
	NC	2.86 ± 1.676			

*p≤0.05.

^Questions are scored on a Likert scale, with 1=Strongly Agree and 5=Strongly Disagree, except for the “how often” and “how many” questions, which are scored on a 0-7 scale for days and a range for minutes of physical activity (1=0-15, 2=16-30, 3=31-45, 4=46-60, 5=>60).

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Wansink, B. (1996). Can package size accelerate usage volume. *Journal of Marketing*, 60: 1-14.

Chapter 3 - Kansans Move into Health: A Program Evaluation

Cover Letter

Dear Editors,

Please find enclosed the following research brief, “Kansans Move into Health: A Program Evaluation” for the *Journal of Nutrition Education and Behavior*. This manuscript is relevant to *JNEB* because it describes a modified intervention that addresses attitude and perceived norms associated with healthy eating and physical activity behaviors through the use of educational materials. The manuscript has not and will not be submitted to another publication source. All authors have reviewed and approved the complete manuscript. Please direct questions and comments to Andrea M. Schrage, the corresponding author. We look forward to your reviews!

Thank you for your time and consideration.

Sincerely,

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Title Page

Kansans Move into Health: A Program Evaluation

The Journal of Nutrition Education and Behavior

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Abstract

Objective: To determine the effectiveness of a modified nutrition and physical activity intervention.

Methods: Four 1-hour classes incorporating nutrition and physical activity topics relevant to the Kansas adult population. Data were collected using a pre- and post-questionnaire scored on a 5-point Likert scale (1=strongly agree, 5=strongly disagree).

Results: Participants (n=12) beliefs significantly changed for two measures ($P<0.05$): “Nutritious foods are expensive ($\text{Mean}_{\text{pre}}=2.36$, $\text{Mean}_{\text{post}}=3.09$)” and “I know how to prepare quick, easy, and healthy snacks ($\text{Mean}_{\text{pre}}=2.75$, $\text{Mean}_{\text{post}}=2.08$).”

Conclusion and Implications: Short nutrition and physical activity interventions may produce changes in healthy eating attitudes. Future studies extending the length of the intervention may be needed to determine the effect of time on behavior change as it relates to physical activity.

Word count=118

Key words: Fruit, Vegetable, Physical Activity, Nutrition

Introduction

Heart disease, cancer, stroke, and diabetes significantly contribute to the leading causes of death in the United States.¹ Both physical activity and a healthy diet, particularly a diet high in fruits, vegetables, and whole grains, provide many health benefits, including preventing and managing chronic diseases.¹ In addition, obesity, which is often associated with these leading causes of death, can be prevented by increasing physical activity and improving diet.² Because obesity rates in the US are rising,^{3,4} public health officials need to address obesity and prevention of chronic diseases by creating short-term community interventions with the aim of changing lifestyle behaviors.

In Kansas, 61% of adults are overweight/obese and 24% are obese,³ which is similar to the national average of 66% overweight/obese and 34% obese.⁴ Furthermore, 51.5% of Kansas adults, compared to 55% of US adults, do not participate in at least 30 minutes of moderate-intensity physical activity on five days per week or more or at least 20 minutes vigorous-intensity physical activity on three days per week or more,⁴ failing to meet the American Heart Association's recommendations of physical activity.⁵ Moreover, only 20% of Kansas adults consume the recommended daily amounts of fruits and vegetables,⁴ which is less than the 25% of Americans that consume the recommend amounts.⁶

In order to address these health concerns in Kansas, Kansas State University Research and Extension developed the nutrition and physical activity program *Kansans Move into Health (KMIH)*, which is based on the framework of Ajzen's Theory of Planned Behavior (TPB).⁷ Two major components of TPB are attitudes and perceived norms, which influence the likelihood of performing a specific behavior.⁷ Because the primary goal of TPB is changing intentions, it is often used in health-related intervention studies. For example, using TPB, Guillaumie and colleagues found that the best predictors of fruit and vegetable intake behavior were habit, motivation and goals, belief about capabilities, knowledge, and taste.⁸ Furthermore, intentions to lose weight were predicted by attitude, subjective norms, and perceived control.⁹ Using health messages in combination with healthy guidelines has generally resulted in engagement in higher physical activity participation.¹⁰ Based on the results of these and other studies, *KMIH* was designed to help participants address attitudes and perceived norms as well as perform specific behaviors associated with healthy eating and physical activity.

The purpose of this study was to determine the effectiveness of a modified 4-week intervention on improving beliefs about and attitudes towards physical activity and healthy eating. We hypothesize that *KMIH* will cause participants to attain knowledge related to healthy behaviors.

Methods

Participants (n=19) were recruited using advertisements at the Johnson County Public Library, on the Extension website, and at a local worksite. Informed consent was collected prior to the start of the program. To be included in the study, subjects were required to attend at least one of the first three classes and the final class (n=12). Eighty-three percent of participants were female, 33% were between the ages 35-44, 92% non-Hispanic, and 58% were white.

All study procedures were approved by the Kansas State University Institutional Review Board. Subjects completed a pre- and post-intervention questionnaire. Originally, the *KMIH* program was developed as an eight-week intervention, but we wanted to investigate the use of a shorter intervention to fit into adults' busy schedules. The modified intervention consisted of four 1-hour classes over the course of four weeks. Each week a lesson relevant to Kansas health concerns was taught, encouraging increased healthy food consumption and increased physical activity participation through the use of health messages. Topics included myths and perceptions regarding healthy eating and physical activity, reading food labels, media sensationalism, portion distortion and eating in moderation, physical activity types and guidelines, emotional eating, and healthy snacks in relation to chronic diseases.

The intervention questionnaire contained four demographic questions obtained from the Behavioral Risk Factor Surveillance System (BRFSS), including sex, age (under 18, 18-24, 25-34, 35-44, 45-54, 55-64, 65+), self-identification of Hispanic, and ethnicity (American Indian/Native American, Asian, white, black/African American, Native Hawaiian/Pacific Islander, Bi-racial, Other). Twenty-one nutrition and physical activity questions were also developed based on TPB constructs. These questions were scored on a 5-point Likert scale (1=Strongly Agree, 5=Strongly Disagree),¹¹ except for the four questions from the BRFSS. These questions ("How much..." and "How many..." physical activity and fruit and vegetable) were numerically ranked (0-7 for days, 0-5 for cups of fruits and vegetables, and 15 minutes increments for physical activity minutes, scored 1-5, with 1=0-15 minutes and 5=greater than 60

minutes) and analyzed (SPSS Statistics version 17.0, SPSS, Inc., Chicago, IL, 2008). Descriptive statistics were calculated for demographics and independent and paired t-tests for comparisons of the means for pre- and post-intervention questions to determine effectiveness of the program through knowledge attainment. An α -level of 0.05 was used to determine statistical significance. Independent t-test comparison of means was used to compare program dropouts and completers. Demographics were not statistically different between the two groups, but there were two physical activity and nutrition measures that were different. Dropouts tended to be neutral about eating more when they were stressed, angry, or sad, whereas completers tended to agree with this measure (Mean=3.00, 1.83, respectively, $p=0.028$). Dropouts also disagreed to the measure, “I like to try new diets or use weight-loss products,” while completers were neutral about the measure (Mean=1.83, 3.25, respectively, $p=0.033$). All other measures were not statistically different ($p<0.05$).

Results

Participants in the *KMIH* program ($n=12$) exercised 2 ½ days per week for 16-30 minutes each session (Table 3.1). They also consumed about 2 ½ cups of fruit and vegetables 5 days per week. Participants also agreed that they live a healthy lifestyle (mean=2.40). These values did not statistically change over the course of the four-week intervention. The present study identified statistically significant differences for two questions. Initially, participants thought that nutritious foods were expensive; however, after the intervention, this belief became neutral (Mean=2.36, 3.09, respectively, $p=0.038$). When considering healthy snacks, before the intervention, participants replied “neutral” to the idea that they knew how to prepare quick, easy, and healthy snacks; whereas after the intervention, the response changed to “agree” (Mean=3.09, 2.08, respectively, $p=0.039$). All other measures were not significantly different pre- and post-intervention.

Discussion

Based on BRFSS data, the participants in this study were, on average, less physically active and consumed fewer cups of fruits and vegetables compared to the Kansas adult population. Interestingly, participants believed that they lived a healthy lifestyle, yet they failed to meet the recommendations set forth by the American Heart Association.⁵ Furthermore,

participants thought that they consumed fruits and vegetables regularly and participated in physical activity regularly, even though they did not meet recommendations. A significant barrier to healthy eating is cost.¹² Initially participants agreed with this belief; however, at the end of the intervention, they shifted towards disagreeing with this belief. Although there was a significant change in two of the nutrition survey measures, this modified intervention did not have a significant influence on physical activity behaviors and beliefs. There was a shift in most beliefs, even though not significant. For example, when participants originally scored “I take the stairs rather than the elevator or escalator when available,” they agreed (Mean=2.27), but there was a shift towards strongly agree by the end of the intervention (Mean=2.00). Eighteen measures resulted in similar shifts in attitude towards healthy behaviors beliefs.

There are several limitations in this study. The dropout rate was fairly high (37%), and the overall sample size was small. Two dropouts did not realize the program was a series and attended only the first class, and another could not attend the final class due to a work conflict. The other four dropouts were lost to follow-up. Promotion in other counties or more classes offered may have increased the sample size. With 83% of the subjects female and 58% white, the sample is also not representative of the Kansas adult population, which is 50% female and 89% white.¹³ However, this population may be representative of the population targeted for this intervention. At the start of the intervention, subjects already believed they lived a healthy lifestyle, regularly consumed fruits and vegetable, and participated in regular physical activity; therefore, they may not have desired to make a healthy lifestyle change, but rather make small adjustments to the daily routines.

Although the Likert scale is often used in survey studies, it does have limitations. The instrument in the present study was scored using a 5-point scale; however, a 4- or 6-point scale would have forced participants to choose a score because it eliminates the middle “neither agree nor disagree” option. Furthermore, respondents may have avoided using extreme responses, contributing to central tendency bias. In addition, because the present study was addressing subjective norms and attitudes related to healthy lifestyle behaviors, participants may have answered the instrument measures according to what is culturally acceptable, leading to socially desirable bias.

The length of the intervention may have also been problematic. The original curriculum, which was based on eight 1-hour classes over eight weeks, contained a component of healthy

nutrition and physical activity in each lesson. Due to the modified length, some material was only briefly discussed. Other slightly longer interventions have produced more substantial results. For example, research on the eight-week Walk Kansas physical activity and nutrition intervention showed that participants engaged in regular physical activity and improved fruit and vegetable consumption during and six months after the intervention.¹³ Other physical activity and nutrition programs have been shown to significantly improve diet and physical activity.¹⁴⁻¹⁶ The *KMIH* program may benefit from an increase in length, using the original eight-1 hour classes over four or eight weeks. Furthermore, a follow-up survey at three or six months may provide additional insight with regards to behavior change.

Implications for Research and Practice

Many chronic conditions and diseases can be managed and prevented by both incorporation of physical activity and a decreased caloric intake.¹ One method commonly used for increasing these healthy behaviors is a community-based intervention that encourages a nutritious diet and engagement in higher levels of physical activity.¹³⁻¹⁶ Because the program was successful in some knowledge attainment in this small-scale study, future research should be aimed at determining the effectiveness of the *KMIH* program in a larger population for a longer period of time. A follow-up survey should be used to determine behavior change as well as sustainability of attitudes and perceived norms changed during the intervention. Further research of the *KMIH* program will provide insight on the value of the information presented during the intervention.

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Table 3.1. Comparison of Means for Pre- and Post-Intervention of Adults Completing the Kansans Move into Health Program (n=12)

Question		Mean	Standard Deviation	Sig. (2-tailed)
I live a healthy lifestyle.	Pre	2.40	0.843	1.000
	Post	2.40	0.516	
Nutritious foods are expensive.	Pre	2.36	0.505	0.038
	Post	3.09	1.044	
I need to spend hours at the gym to achieve health benefits.	Pre	3.50	0.905	0.191
	Post	3.75	0.866	
I read nutrition labels at the grocery store.	Pre	1.92	0.900	0.586
	Post	1.83	0.577	
I know what to look for on nutrition labels.	Pre	2.17	0.718	0.104
	Post	1.83	0.389	
I try to finish meals at restaurants.	Pre	2.67	1.303	0.504
	Post	2.50	1.000	
I share my meals with others at restaurants.	Pre	2.58	1.165	0.777
	Post	2.67	1.231	
I typically eat salads at restaurants because they are healthier than entrée options.	Pre	3.33	1.155	0.777
	Post	3.25	0.965	
I exercise during the workday by taking breaks, standing, and/or stretching.	Pre	2.58	1.240	0.615
	Post	2.42	0.996	
I exercise while on vacation.	Pre	3.08	1.165	0.586
	Post	2.92	0.793	
I take the stairs rather than the elevator or escalator when available.	Pre	2.27	1.104	0.082
	Post	2.00	1.000	

I exercise regularly.	Pre	2.60	1.350	0.443
	Post	2.40	1.075	
How often (in days) do you exercise per week?	Pre	3.09	2.166	0.167
	Post	3.64	2.378	
How many minutes per session are you physically active?	Pre	2.00	0.707	0.447
	Post	2.22	0.833	
I eat more when I am stressed, angry, or sad.	Pre	1.83	0.937	0.104
	Post	2.17	1.115	
I eat more despite feeling full.	Pre	2.83	1.267	0.851
	Post	2.92	1.240	
I know how to plan quick, easy, and healthy snacks.	Pre	2.75	1.055	0.039
	Post	2.08	0.669	
I like to try new diets or use weight-loss products.	Pre	3.25	1.215	0.881
	Post	3.33	1.371	
I eat fruits and vegetables regularly.	Pre	2.17	1.115	0.429
	Post	1.92	0.669	
How often (in days) do you eat fruits and vegetables per week?	Pre	5.58	2.018	0.602
	Post	5.27	1.618	
How many cups of fruits and vegetables do you eat per day?	Pre	2.40	1.265	0.223
	Post	2.80	1.317	

*Questions are scored on a Likert scale, with 1=Strongly Agree and 5=Strongly Disagree, except for the “how often” and “how many” questions, which are scored on a 0-7 scale for days and a range for minutes of physical activity (1=0-15, 2=16-30, 3=31-45, 4=46-60, 5=>60).

**Appendix A - Advertisement Used on the Johnson County Website
and Newsletter**

Johnson County K-State Extension Classes

To register,
call
(913) 715-7000

**Enroll early!
Classes sell out
quickly!**

- Advance registration with payment required.
- Make checks payable to: Johnson County Extension Council.
- To register online and pay with credit card, go to www.johnson.ksu.edu/classes
- Location: Classes are at the Extension office unless noted in the class description.

4-H/Youth Development

Creepy Crawlies

Come learn about our friend the worm! Vermiculture (or worm farming) is an efficient way to utilize compostable waste (yard clippings, kitchen scraps, leaves, etc.). Each participant will learn what a worm needs to "work" well and construct a starter worm compost container to take home and use!

Tuesday, Sept. 21

7 p.m.

Fee: \$15

Winter Wildlife Project

Come and learn about backyard wildlife and their habitat needs. Sometimes in the winter food can become scarce for our wild friends. Each participant will have an opportunity to make a tasty treat for their backyard buddies.

Tuesday, Oct. 5

7 p.m.

Fee: \$15

Head, Heart, Hands and Health

Ever wonder what 4-H's all about? Attend this free informational meeting to learn more about Johnson County 4-H, a free community-based program coordinated through Kansas State University Extension. Staff will go over the basics of 4-H, answer any questions and help organize a community club in your area. 4-H is one of the oldest youth organizations in the United States and has over 34 participation project areas for youth. Project leaders and adult volunteers are encouraged to attend as well!

Monday, Oct. 11

7 p.m.

Fee: Free

GPS/GIS Basics

Coordinates, global positioning system devices and more! Learn the basics of

geocaching (GPS/GIS) to develop a community-based network of information. Participants will plot the meeting location's coordinates and learn how to input data into a community mapping project. This skill can be used in the future to participate in geocaching contests and expand the community's GIS database.

Thursday, Oct. 14

7 p.m.

Fee: \$10

Family & Consumer Sciences

Preserving Apples

Learn the basics of different food preservation methods — freezing, canning, drying — on one food item, the apple. Spend time in the kitchen preserving a sample to take home.

Saturday, Oct. 2

9:30 a.m. – 12:30 p.m. approx.

Fee: \$10

Instructors: Nichole Burnett, MS, RD/LD, Family and Consumer Sciences Extension Agent and Master Food Volunteers

Sewing for Others

Projects for various community agencies will be made. They will include draft catchers, baby blankets, personal bags, comforters and sleeping bags. Everyone is welcome. You do not need sewing skills. We need people to cut, press, pin and perform other tasks, also.

First Tuesday each month: Oct. 5, Nov. 2, Dec. 7

1 – 4 p.m.

Instructor: Linda Jean, Extension Volunteer

Fee: None

The De Soto chapter meets the first and third Tuesdays of each month at the Baptist Church in De Soto. For more information please call Francis Lawhead (913) 585-1098.

Knitting Beyond the Basics

After mastering knit and purl stitches you're ready for new challenges. At the end of this two-session class, you will understand the usefulness of knitting tools, know the basics of reading a pattern and have experience making a beautiful pattern stitch to enhance your knitting. Bring your own knitting needles and practice yarn.

Wednesdays, Oct. 6 and Oct. 13

10 – 11:30 a.m.

Fee \$25

Instructor: Valeria Edwards

Location: Roeland Park Community Center, 4850 Rosewood, Roeland Park, KS

Move Into Health

Do you struggle staying motivated to eat healthy and workout? Do you overindulge in sweets when you feel stressed? This series is designed to help you address attitudes about health as well as give you control over making lifestyle changes to lead to better health. Each lesson helps you identify an important healthy lifestyle behavior, overcome barriers that could prevent you from being healthy, and develop goals for maintaining healthy lifestyle behaviors.

Oct. 13, 20, 27, & Nov. 3

Noon – 1 p.m.

Fee: Free

Instructors: Nichole Burnett, MS, RD, LD, Extension Agent, Family and Consumer Sciences, and Andrea Schrage, K-State Graduate Student

Location: Johnson County Library, 9875 W. 87th St., Overland Park, KS 66212

To enroll please contact Melody Kinnamon: KinnamonM@jocalibrary.org or (913) 495-7587

Appendix B - Advertisement Used at the Johnson County Library

	Move Into Health
Date	10/13/2010
Time	12:00PM - 1:00PM
Contact	Johnson County Library (913) 495-2400
Description	<p>Do you struggle staying motivated to eat healthy and workout? Do you overindulge in sweets when you feel stressed? This series is designed to help you address attitudes about health as well as give you control over making lifestyle changes to lead to better health. Each lesson helps you identify an important healthy lifestyle behavior, overcome potential barriers that could prevent you from being healthy and develop goals for maintaining a healthy lifestyle.</p> <p>Ongoing program with events 10/13/2010, 10/20/2010, 10/27/2010, 11/3/2010.</p> <p>Cost: FREE</p> <p>Registration: Please register online or by phone at (913) 495-2400 starting Sept. 1.</p> <p>Location: Central Resource Library 9875 W. 87th St. Overland Park, KS 66212 map</p> <p>Sponsored by: Johnson County Library</p> <p><i>More Health & Wellness events</i></p>

Appendix C - Informed Consent Form

KANSAS STATE UNIVERSITY

INFORMED CONSENT

PROJECT TITLE: Kansans Move into Health 2010 Program Evaluation

APPROVAL DATE OF PROJECT: Oct 1, 2010 EXPIRATION DATE OF PROJECT: Oct 1, 2011

PRINCIPAL INVESTIGATOR: CO-INVESTIGATOR(S): Tandalayo Kidd, PhD, RD, LPN
Andrea Schrage, BA

CONTACT AND PHONE FOR ANY PROBLEMS/QUESTIONS: Tandalayo Kidd, 785-532-0154

IRB CHAIR CONTACT/PHONE INFORMATION: Rick Scheidt/785-532-1483

SPONSOR OF PROJECT: none

PURPOSE OF THE RESEARCH: Evaluate the effectiveness of this nutrition and physical activity program.

PROCEDURES OR METHODS TO BE USED: Pre- and post-surveys

ALTERNATIVE PROCEDURES OR TREATMENTS, IF ANY, THAT MIGHT BE ADVANTAGEOUS TO SUBJECT:
N/A

LENGTH OF STUDY: Four 1-hour lesson over four weeks

RISKS ANTICIPATED: No known risks besides the 60 minutes time commitment for 4 weeks

BENEFITS ANTICIPATED: The benefits of regular physical activity and incorporating fruits and vegetables into the diet are improvements to the cardiovascular, digestive, neurological, muscular, skeletal, respiratory, and endocrine systems.

EXTENT OF CONFIDENTIALITY: Names of participants will not be used in presentations or reports of the evaluation results. The name of participants will only be used to match pre and post measures to determine the effect of the intervention. Records will be stored in a secure location away from public access.

IS COMPENSATION OR MEDICAL TREATMENT AVAILABLE IF INJURY OCCURS: No

PARENTAL APPROVAL FOR MINORS: N/A

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

(Remember that it is a requirement for the P.I. to maintain a signed and dated copy of the same consent form signed and kept by the participant

Participant Name: _____

Participant Signature: _____

Date: _____

Witness to Signature: (project staff) _____

Date: _____

Appendix D - Kansans Move into Health—Participant’s Survey



KANSANS MOVE INTO HEALTH—PARTICIPANT’S SURVEY

Date: _____ County/District: _____
 Gender: Male Female
 Age: Under 18 18-24 25-34 35-44 44-54 55-64 65+
 Are you Hispanic or Latino? Yes No
 Which of the best describes you? American Indian/Native American Asian White
 Black/African American Native Hawaiian/Pacific Islander Bi-racial Other

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Rate the following for					
I live a healthy lifestyle.					
Nutritious foods are expensive.					
I need to spend hours at the gym to achieve health benefits.					
Rate the following on grocery store habits					
I read nutrition labels at the grocery store.					
I know what to look for on nutrition labels.					
Rate the following on dining out:					
I try to finish meals at restaurants.					
I share my meals with others at restaurants.					
I typically eat salads at restaurants because they are healthier than entrée options.					
Rate the following on physical activity					
I exercise during the workday by taking breaks, standing, and/or stretching.					
I exercise while on vacation.					
I take the stairs rather than the elevator or escalator when available.					
I exercise regularly.					
How often (in days) do you exercise? <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7					
How many minutes per session are you physically active? <input type="checkbox"/> 0-15 <input type="checkbox"/> 16-30 <input type="checkbox"/> 31-45 <input type="checkbox"/> 46-60 <input type="checkbox"/> >60					
Rate the following on eating habits					
I eat more when I am stressed, angry, or sad.					
I eat more despite feeling full.					
I know how to plan quick, easy, and healthy snacks.					
I like to try new diets or use weight-loss products.					
I eat fruits and vegetables regularly.					
How often (in days) do you eat fruits and vegetables? <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7					
How many cups of fruits and vegetables do you eat per day? <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> >5					

Thank you!